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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/555,853 | 11/01/2005 | Yasuo Ohama | ISH-0248 | 4615 |
| 7590 Carl Schaukowitch RADER, FISHMAN & GRAUER PLLC 1233 20th Street, N.W., Suite 501 Washington, DC 20036 | | | EXAMINER SONG, MATTHEW J | |
| | | | ART UNIT 1792 | PAPER NUMBER |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/555,853

Applicant(s)

OHAMA, YASUO

Examiner

MATTHEW J. SONG

Art Unit

1792

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 June 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 29-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 35-41 and 43 is/are allowed.
- 6) ☒ Claim(s) 29-34 and 42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/S5108)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(c) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/3/2009 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claim 30 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 30 recites, "a transparent layer made of a synthetic quartz glass with a thickness of 0.2 to 1.5 mm is formed in the range from 0.15 to 0.55 L" in lines 2-4. Claim 29, from which claim 30 depends, already recites "a transparent synthetic quartz glass is formed on the inside of the crucible in the range from at least 0.15 to 0.55 L." There is no support in the original disclosure for two transparent synthetic quartz glass layers formed in the range of 0.15 to 0.55. For the

purpose of expediting examination, the claim is interpreted as further limiting the transparent synthetic layer by specifying the thickness of the transparent synthetic layer.

4. Claim 42 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 42 recites, "9.3M" in line 42. There is no support for 9.3 M, however there is support for 0.3 M, which suggests a typographical error.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 29-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kemmochi et al (US 2003/0012899) in view of Sato et al (US 6,136,092) and Ohama (US 2002/0192409 A1).

Referring to claim 29, Kemmochi et al teaches a quartz crucible comprising an outer layer formed by melting natural silica powder (pure quartz grain such as natural silica) ([0047] and [0051]); a first transparent layer **18** made of natural quartz formed on the inside thereof (Fig

3, [0035]-[0036]); and a second transparent layer **16** made of synthetic quartz glass formed over the entire inside surface, which clearly suggests a transparent layer formed on the inside of the crucible from 0-1.0 L (Fig 1 shows a transparent layer 16 over the entire inside surface; Fig 3; [0035]-[0036]). Kemmochi et al teaches a transparent layer from 0-1.0L, thus comprises at least 0.15-0.55L.

Kemmochi et al teaches an outer translucent silica glass layer ([0030]). Kemmochi et al does not teach an opaque outer layer.

In a method of forming a quartz crucible, note entire reference, Sato et al teaches an opaque outer layer and a transparent inner layer (col 3, ln 30-40).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Kemmochi et al by using an opaque outer layer, as taught by Sato et al, because an opaque outer layer has a higher strength (Sato col 1, ln 40-50).

The combination of Kemmochi et al and Sato et al does not explicitly teach the first transparent layer has a thickness of 0.4-5.0 mm. The combination of Kemmochi et al and Sato et al teaches a side portion has a thickness of 10.0 mm with an inner layer of 0.2-1.0 mm and a bulk layer of 6.5-9.4 mm, thus a first transparent layer having a thickness within the range 0.4-5.0 mm can be inferred based on a total thickness of 10.0 mm ('899 [0031] and [0038]), for example a bulk layer thickness of 6.5 mm with an inner layer thickness of 1 mm would suggest a thickness of 2.5 mm for the first transparent layer. Furthermore, Ohama et al teaches a quartz crucible comprising a translucent outer layer of quartz, a transparent inner layer and an intermediate layer ([0013]-[0016]). Ohama et al also teaches the thickness of the intermediate layer of 0.5 mm or more ([0023]).

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Kemmochi et al and Sato et al by using an intermediate layer of 0.5 mm or more, as taught by Ohama et al, to provide a crucible with sufficient strength to the crucible ([0019]).

Referring to claim 30, the combination of Kemmochi et al, Sato et al, and Ohama et al teaches a second transparent layer thickness of 0.2-1.0 mm (Kemmochi [0031]), which is entirely within the claimed range of 0.2 to 1.5 mm.

Referring to claim 31, the combination of Kemmochi et al, Sato et al, and Ohama et al teaches forming a transparent inner layer **16** over the entire inner surface which suggests 0-1.0 L, as discussed previously, which clearly suggests an inner surface from 0.6 to 1.0 L is made of transparent quartz glass. The combination of Kemmochi et al, Sato et al, and Ohama et al also teaches the inner layer **16** is formed by introduction of inner silica grain, such as natural silica (natural quartz glass), or alternatively synthetic silica grain (Kemmochi [0051] and [0054]). The combination of Kemmochi et al, Sato et al, and Ohama et al does not explicitly teach the inner surface from 0.6 to 1.0 L is made of natural quartz glass. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Kemmochi et al, Sato et al, and Ohama et al by forming the inner layer from a combination of the materials suggested by Kemmochi, natural and synthetic quartz, because the combination of known materials suitable for their intended purpose would have been obvious to one skilled in the art. Furthermore, combination of raw material natural quartz and synthetic quartz is known in the art of crucible manufacturing as evidenced by Ohama et al (US 2002/0192409) in paragraphs [0029]. A crucible transparent inner layer made of synthetic and natural quartz glass would

clearly suggest an inner surface made of natural quartz glass because the claim is open to additional materials.

Referring to claim 33, the combination of Kemmochi et al, Sato et al, and Ohama et al teaches an opaque silica with an OH group concentration of 80 ppm or less (Sato col 3, ln 55-67), which overlaps the range of 20 to 60 ppm for the outer layer. The combination of Kemmochi et al, Sato et al, and Ohama et al also teaches an inner layer with an OH concentration of 100-400 ppm to a depth of 1 mm, with an inner layer thickness of 0.5 mm ('409 [0023]), which suggests an intermediate layer OH concentration of 100-400 ppm for the intermediate layer because the OH range of 100-400 ppm extends to a depth of 1 mm and the inner layer thickness is only 0.5 mm, thus the range of 100-400 ppm includes the intermediate layer. It is noted overlapping ranges are prima facie obvious (MPEP 2144.05). In regards to the relation limitation, $C_A > C_B > C_C$, the combination of Kemmochi et al, Sato et al, and Ohama et al teaches a C_A of 20 to 60 ppm and a C_C and C_B of 100-400ppm, thus $C_A > C_C$ and $C_B > C_C$. The combination of Kemmochi et al, Sato et al, and Ohama et al does not explicitly teach the relationship of C_B to C_C is $C_B > C_C$. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Kemmochi et al, Sato et al, and Ohama et al to have the claimed relationship of $C_B > C_C$, because the combination of Kemmochi et al, Sato et al, and Ohama et al teaches ranges of OH concentration and selection of OH concentrations within with range taught would have been obvious, and nominal differences in concentration such as a C_B of 100 ppm and a C_C of 99.99 ppm, would have been obvious one skilled in the art.

Referring to claim 34, the combination of Kemmochi et al, Sato et al, and Ohama et al teaches forming a crucible with an opaque outer layer, a transparent natural quartz layer and a transparent inner quartz layer formed on at least 0.15 to 0.55 L, as discussed previously in regards to claim 29. The combination of Kemmochi et al, Sato et al, and Ohama et al also teaches feeding silica powder into a rotating mold to form the crucible body, feeding natural silica grain which is partially melted and fused to the body and then feeding inner silica grain (See Kemmochi [0055]-[0059] in regards to the method of forming a bulk layer, transition layer and inner layer).

Allowable Subject Matter

7. Claims 35-41 and 43 are allowed.
8. The following is an examiner's statement of reasons for allowance: The closest prior art is Nakajima et al (US 5,306,473) and Sato et al (US 6,136,092). Nakajima et al teaches a quartz crucible comprising an opaque outer layer and a transparent inner layer (col 4, ln 45-55). Sato et al (US 6,136,092) teaches a quartz crucible comprising an opaque outer layer and a transparent inner layer (col 3, ln 30-40). Referring to claim 35, Nakajima et al and Sato et al does not teach, suggest, or provide any rationale for a crucible characterized in that the number of brown rings per unit area observed in the range from the initial surface level of a silicon melt to 0.3 M in terms of a length M from the initial surface level of the silicon melt to the surface level of the remaining melt after pulling up a single crystal measured along the inner surface of the quartz glass crucible is 1.8 fold or more greater than the number of brown rings observed in the range

up to 0.3 M above the surface level of the remaining melt. The prior art is completely silent to the number of brown or any relationship of the number of brown rings to the crucible surface in regards to initial melt level or remaining melt, and one of ordinary skill in the art would not have found it obvious to obtain the claimed brown rings number because brown rings are likely to introduce dislocations and reduce yield (See page 14, first full paragraph of applicant's specification). It is also noted that the prior art crucible would not be expected to have the claimed brown ring number because Applicant teaches specific steps to obtain a crucible with the claimed property by forming a transparent layer a mixture of natural and synthetic silica, or by etching or sandblasting a synthetic quartz glass (See page 19, lines 1-26 of Applicant's specification). Furthermore, Applicant teaches the number of brown rings may vary depending on the conditions of pulling up a single crystal even if the same crucible is used (See page 15, lines 8-10 of the specification), thus the property cannot be inherent from the prior art crucible.

Referring to claims 36-41 and 43, the same reasons for allowance apply because the claims depend from independent claim 35.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

9. Applicant's arguments with respect to claims 29-34 and 42 have been considered but are moot in view of the new ground(s) of rejection. It is noted that the new grounds of rejection

incorporates the previous prior art, however the Nakajima reference is not applied because the current claims are broader since the transparent layer is not "only" on a specific portion of the crucible.

10. Applicant's arguments filed 6/3/2009 have been fully considered but they are not persuasive.

Applicant's argument that the prior art does not teach all of the claimed features is noted but not found persuasive. As discussed above, the prior art does teach all of the claimed features of claims 29-34. It is also noted that Applicant has not specifically identified any particular feature which is not taught by the prior art.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to MATTHEW J. SONG whose telephone number is (571)272-1468. The examiner can normally be reached on M-F 9:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Kornakov can be reached on 571-272-1303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew J Song
Examiner
Art Unit 1792

MJS
August 29, 2009

/Matthew J Song/
Examiner, Art Unit 1792